WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* THE LITTLE GREEN MEN

A ranking Air Force official expressed concern this week, apparently over the prospect that no armed guards will accompany the representatives of the civilian National Aeronautics and Space Administration on a lunar expedition planned to take place before the end of the decade. At the same time, the Air Force made available its thoughts on the necessity of military operations on the moon. (See SCIENCE TRENDS, October 16, 1961)

Major General James F. Whisenand, Deputy Chief of Staff Plans, Air Force Systems Command, warned:

"In all the history of mankind, exploration is dangerous, and the unexpected has been expected by the explorer. Explorers, traditionally, have been armed. I don't know whether or not there are any little green men out there -- but we are planning the longest exploration in the history of man -- into the greatest of unknowns -- and the explorer will be, for the first time, unarmed."

* THE MILITARY MOON BASE

The Air Force Systems Command has asked industry to submit proposals by November 24, 1961 for a manned lunar roving vehicle (LRV) to be designed so that it could be available by 1966, for possible employment on the moon by 1969. A February, 1962 contract is anticipated.

"Within the next decade, man will reach the moon," according to the official Air Force statement. "After this initial accomplishment, evolution of a lunar base complex will begin.

"Such a complex will possess great military potential since nearly all missions that can be accomplished by an earth satellite could also be fulfilled from a lunar emplacement. Such a complex would possess a superior location for many operations due to the readily available material source and a gravitational environment.

"A force deployed on the moon would be capable of performing such military functions as cislunar and space surveillance, identification as well as destruction of hostile space vehicles, space control, monitoring and increasing deterrent capabilities...."

* THE LUNAR ROVING VEHICLE

The Air Force states that its Lunar Roving Vehicle should be capable of transporting a three-man crew and cargo at a maximum of 5-10 miles per hour, with a minimum range of 250 miles without refueling or resupply. A wheeled or tracked vehicle is specified. The vehicle should fit in a 40-foot long 14-foot diameter cylinder, and should weigh less than 20,000 pounds. Requirements include towing, bulldozing, manual and remote-controlled manipulators and radio-type communications.

* THAT SEMICONDUCTOR MARKET

Commerce Department again confirms what most electronic organizations already know -- semiconductor shipments are up from last year, but prices are declining. Comparing the second quarter of 1961 and 1960, the Department finds:

✓ Germanium transistors -- unit shipments up 68 percent; average unit prices down 31 percent.

✓ Germanium diodes -- unit shipments up 66 percent; prices down 38 percent.

✓ Silicon transistors -- shipments up 39 percent; prices down 34 percent.

✓ Silicon diodes -- shipments up 13 percent; prices down 31 percent.

Note: Declining prices caused a reduction of nearly 11 percent in total dollar volume of silicon semiconductor sales from a year ago. Despite falling prices, shipments of germanium devices rose about 13 percent in total value.

(The Electronics Division, BDSA, U. S. Department of Commerce, Washington 25, D. C. has available some single free copies of Announcement BD-61-188 outlining similar statistics for a wide variety of electronic components.)

* RADIOACTIVE BOUNDARY MARKERS

The Bureau of Land Management, U. S. Department of the Interior and the Atomic Energy Commission are cooperating in a feasibility study to determine whether minute quantities or radioactive isotopes can aid in the location of lost boundary markers. Regular brass corner markers have a habit of becoming buried or stolen. A large part of the work of BLM surveyors involves finding old surveys and re-establishing survey monuments. If it proves practical to mark these monuments by planting isotopes in them, the exact position could be relocated with a radiation counter -- even though the brass marker couldn't be seen.

* FILAMENT WOUND STRUCTURES

The Navy is expressing interest in the problems of how well glass filament wound material can stand up under high external pressures. Most research has been centered on tensile strength and internal pressure problems, in the past. Now the Bureau of Ships, Code 634C, Department of the Navy, Washington 25, D. C. has asked for research proposals on laminate materials. Target objective is a compressive strength of 150,000 psi.

* NATO RESEARCH FELLOWSHIPS

A limited number of advanced research fellowships are available for "scholars of established reputation" from member countries of the North Atlantic Treaty Organization, including the U. S., with the emphasis on projects in the historical, political, economic and social field. (Complete details are available from the Conference Board of Associated Research Councils, Committee on International Exchange of Persons, 2101 Constitution Avenue, N. W., Washington 25, D. C.)

* PROJECT GNOME

The White House this week confirmed major details of plans for Project Gnome, underground nuclear tests in New Mexico Salt Beds. This and follow-on programs were reported in Washington SCIENCE TRENDS, July 24, 1961 with a predicted test date of December, 1961. The White House on October 25, 1961 said the tests will occur "in about 60 days."

* U. S. TO SPONSOR ORE TESTS IN GERMANY

The new Area Redevelopment Administration, U. S. Department of Commerce, Washington 25, D. C. has approved a $65,000 technical assistance project under which the Fried Krupp Works, Essen, West Germany will test low-grade non-magnetic ores from Northeastern Minnesota for possible use in iron and steel production. The firm is said to be the only one capable of such tests.

* ARMY TRANSPORTATION RESEARCH PROBLEMS

Here are the remaining research and development problem abstracts as compiled by the U. S. Army Transportation Command. For further information and instructions see Washington SCIENCE TRENDS, October 9 and October 16, 1961.

- TC - 74 -- Devise methods for preventing damage to ball-bearing assemblies resulting from self-generated static discharge. (Recent work has revealed that failure in ball bearings used in rotating machinery can often be traced to static discharges through the oil film that pit the race surface. Small potential differences can exist between the inner and outer races. These small differences acting on a very thin film of oil are enough to produce local breakdown of the oil film, with consequent arcing and pitting. This is a contributing factor toward the short life of some rotary bearing systems that support high loads. Solutions to this problem will assist in reducing the maintenance requirements of a mobile army.)

- TC - 76 -- Develop improved metal-to-metal bond inspection techniques. (Structural joints formed by the bonding of components with resin or other types of metal-to-metal glues are widely used in the aviation industry, and they will find wider application as developments continue. The strength of such joints depends entirely on the bonds formed. Improved methods are required for inspecting such bonds to determine the presence of bubbles, poor interface adhesion, cracking, and so on, to insure the structural integrity of the joints. It is desirable that the inspection methods be amenable to both field and depot use.)

- TC - 78 -- Develop simple nonmechanical means for controlling the temperature within cargo containers. (Many cargo shipments require a carefully controlled temperature environment to maintain their operational capabilities while in storage. Static systems wherein the package maintains a predetermined temperature without a mechanical refrigeration system are required. These could be fuel-cell operated or operated by the use of dry ice under pressure or other means.)

- TC - 80 -- Develop material finishes suitable for protection of operational equipment in all-weather operation. (In view of the world-wide environmental conditions under which the Army's vehicles and equipment will operate, there is a distinct need to develop protective materials that can be applied simply and easily in the field to new or repaired aircraft materials to prevent corrosion. With the advent of ground effect machines for continuous operation in salt-laden atmospheres, together with the many low-flying missions associated with Army aircraft, it is vital that all materials resist erosion and corrosion. The level of maintenance required at the present time to counteract the natural erosion and corrosion of airborne equipments is extremely high. Data now available on spray-on cermets and other corrosion-resisting finishes suggest new and unique methods for substantially reducing servicing and maintenance. It must be possible to apply these finishes during forward-base operation. A method, possibly the use of a protective coating, which will prevent the adhesion of mud to vehicles is desired.)

- TC - 81 -- Develop a means of delivering cargo from ship to shore while the ship is in motion. (Stationary ships discharging cargo are vulnerable to enemy action. This vulnerability would be reduced by keeping the vessel in motion during discharge of cargo. Watertight floating containers, a means for corralling these containers, and a system for getting the containers to the beach will be required.)

- TC - 59 -- Develop means for reducing the POL logistics problem. (Consideration should be given to: utilization of the large energy density of nuclear fuels, such as by employing a nuclear reactor or a contained underground nuclear explosion to produce fuels that can be used in conventional engines; advanced engine concepts; stored and regenerative energy systems; engines utilizing energy radiation techniques; engines utilizing abundantly available natural materials that require no preprocessing or which can be conveniently processed in the field using a minimum of special equipment; and multifuel engines; fuel cells have much promise.)

TECHNICAL TRENDS

□ Reports on Corrosion Research Institutes (QR 2034) and Friction Welding (QR 1913) are available without charge from the Specialized Information Section, EPA-OECD, 2 Rue Andre Pascal, Paris XVI, France. √√√ Final proposals for Antarctic research for the 1962-1963 field season are due February 15, 1962 at the Office of Antarctic Programs, National Science Foundation, Washington 25, D. C. The staff is prepared to discuss ideas informally prior to that date. √√√ Michigan State University, East Lansing, Mich. has agreed to accept a $700,000 grant for construction of a 50 million electron volt cyclotron in the Department of Physics and Astronomy, and $400,000 for a new commercial computer, type unspecified. Both grants come from the National Science Foundation. √√√ The National Aeronautics and Space Administration has signed ten-month contracts with Aerojet General Corp. and Rocketdyne Division of North American Corp. to determine whether an "unconventional" liquid rocket engine and vehicle design can be developed and produced at significant savings, and with increased reliability. Units under consideration range in thrust from two to 24 million pounds.

□ Republic Aviation Corp., Farmingdale, Long Island has received a $16,800 contract to determine requirements for an emergency control system that can be adapted to any new submarine class. √√√ Sperry Rand Inc., Great Neck, N. Y. expresses belief that its "Meanderline" traveling wave tube will prove valuable in ground defense radars by providing a new high power ability to avoid airborne electronic jamming. √√√ The University of Michigan, Institute of Science and Technology will study long-range navigation equipment and techniques under a new $70,000 Federal Aviation Agency contract. Approaches to be studied include inertial systems, satellites, very low frequency (VLF) radio and aircraft heading references. √√√ Engineers at AC Spark Plug, Advanced Concepts Research and Development, Milwaukee, Wisconsin, state they can extend gyroscopic bearing lifetimes to many thousands of hours through a new technique which removes virtually all oxygen from bearing lubricants. Oxidation deposits measuring 0.045 milligrams were found to be enough to cause bearing failure (a cubic inch of air weighs about 450 times more than such deposits). √√√ The Martin Company has delivered its SNAP 7-C, 10 watt generator to the Navy for use in powering an automatic unmanned weather station in the Antarctic. The station will automatically transmit data every six hours over a distance of more than 400 miles, or can be "triggered" by radio pulses from land or air to transmit more frequently. √√√ The National Science Foundation, Washington 25, D. C. expects to make some 135 awards for postdoctoral study and/or research in a number of fields. Applications must be submitted by December 18, 1961.

□ The Air Force Office of Scientific Research (AFOSR), Washington 25, D. C. has available Release No. 10-61-3 listing new basic research grants and contracts to 43 U. S. and two Canadian organizations. √√√ The National Aeronautics and Space Administration is moving to acquire some 13,500 acres in southwest Mississippi as a static test facility for Saturn and Nova-class large launch vehicles. The site is about 35 miles from the space agency's new moon program plant at New Orleans. √√√ Information on a Fortran program to compute "Negative Binomial Probability Distribution Tables" is available from the Logistics Research Project, G. W. University, 707 22nd St., N. W., Washington 7, D. C., Attn: M. Hershkowitz. √√√ The Information Office, U. S. Atomic Energy Commission, Washington 25, D. C. has available single free copies of Announcement IN-265 listing 24 new and 23 renewed contracts for radioisotope and radiation technology r&d. √√√ The National Bureau of Standards, Office of Technical Information, Washington 25, D. C. has available a report on an ionization chamber said to be capable of determining total betatron and synchotron X-ray beam energies to within 2 percent. √√√ The Air Force expects to negotiate with Optics Technology, Inc., Belmont, Calif. for expanded research efforts to develop an experimental fiber optics scanning device.

RESEARCH CHECKLIST

□ FLUORINE RECOVERY RESEARCH: The U. S. Bureau of Mines has been paying increased attention to the development of processes for recovering fluorine from offgrade ores to meet increasing demand. One aspect of this program has been development of a pyrohydrolitic process for liberating fluorine from offgrade fluorspars. Limited tests have been encouraging enough to warrant an intensive investigation of molten defluorination processes, according to Bureau researchers.

(For further information, see Report of Investigation No. 5809. Single Free copies are available from the Publication-Distribution Office, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa.)

□ HIGH TEMPERATURE MICROSCOPE: A high temperature microscope designed at Los Alamos Scientific Laboratory, is being used for a variety of investigations at temperatures up to and above 2500°C, without the complex adaptations of refracting systems said to be required when other types of microscopes are used at high temperatures. The device achieves this by making use of an older microscope system -- reflection. A concave, ellipsoidal, first-stage mirror employed has a working distance of four inches and a numerical aperture of 0.47. Such mirrors are said to be available in large diameters at reasonable cost, and eliminate the need for a second reflecting mirror. An accompanying split-tube resistance heater brings specimens as large as ½ inch in diameter to temperatures above 2500 C without damage to the optical system. The device has had a number of applications including photomicrographs of the crystal structure of iron.

(Development by D. Olson, CMF-13, Los Alamos Scientific Laboratory of the University of California, Los Alamos, New Mexico)

□ MILLIMETER WAVE STUDIES: The National Bureau of Standards has developed a technique for the study of millimeter waves which in effect treats this largely inaccessible region of the radio spectrum as lightwaves. The basic development is a reflector to resonate such waves, and which can be used with associated equipment to determine the length of millimeter waves, or to investigate various materials when exposed to such waves. Since millimeter waves form a band of frequencies between microwaves and the infrared, they provide an important field for research. They can be used, the Bureau points out, for studying the properties of superconducting materials and for studying the electron density of heavily ionized gases. Also, a better understanding of these frequencies is expected to lead to new devices, just as radar developed from the ability to handle microwaves.

(For further details of the "Millimeter Wave Fabry-Perot Interferometer" write National Bureau of Standards, Office of Technical Information, Washington 25, D. C.)

□ GYROS FOR SATELLITE ATTITUDE CONTROL: The National Aeronautics and Space Administration is investigating the use of gyros as torque sources for precise control of satellite attitude. One possible application is the Orbiting Astronomical Observatory. The gyros -- of the single degree of freedom integrating type -- also act as rate sensors as well as torque sources. This means that no rate stabilization networks are required, and when no error sensor is available, the vehicle is still rate stablized. However, there are certain disadvantages when such a system is compared to an inertia wheel system.

(For further details, see NASA Technical Note D-1073 available from National Aeronautics and Space Administration, 1520 H Street, N. W., ATTN: CODE BID, Washington 25, D. C.)

PUBLICATION CHECKLIST

- ☐ HYDRAULIC RESEARCH, the latest edition of a valuable guide to research projects and personnel in various hydraulic and hydrologic laboratories in the U. S. and Canada. Compiled by the National Bureau of Standards. 220 Pages. $1.25. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for NBS Miscellaneous Publication No. 238 -- Hydraulic Research)

- ☐ SCIENCE, ASTRONAUTICS AND DEFENSE, a review of scientific and astronautic research and development in the Department of Defense as of mid-1961. 68 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Building, Washington 25, D. C. for Staff Report -- Science, Astronautics and Defense)

- ☐ GLASS FIBER SOLID PROPELLANT ROCKET MOTOR CASES, a technical review of some of the late developments and problems in glass fiber structures, such as those to be used in the Polaris and Minuteman ICBM upper stages. Includes a handy glossary of some glass terms for those new to the field. 17 Pages. (Single Copies of DMIC Memorandum 110 available without charge to Government agencies, their contractors, subcontractors and suppliers. Write Defense Metals Information Center, Battelle Memorial Institute, Columbus 1, Ohio)

- ☐ ENCAPSULATED AEROSOLS, a report by Stanford Research Institute for the Chemical Warfare Center on three general approaches to aerosol encapsulation, said to be the first general investigation of basic principles in the field. Includes a description of new techniques involving particles from one to one hundred microns in size. 38 Pages. (AD 255 010 available through military channels or write OTS, U. S. Department of Commerce, Washington 25, D. C. for sales price)

- ☐ SCIENCE IN PRIMARY SCHOOLS, a British pamphlet on instruction for younger students, including some simple experiments. 36 Pages. 45 cents. (Write British Information Services, 45 Rockefeller Plaza, New York 20, N. Y. for Ministry of Education Pamphlet No. 42)

- ☐ DIESEL ENGINES, a report on the criteria for selection of diesel driving engines for continuously-operated or long-running generators to be used in fixed installations. 31 Pages. $2. (Write Printing-Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, N. W. for Publication No. 889)

- ☐ SCIENCE INFORMATION IN LATIN AMERICA, a new directory and description of science information centers and libraries. 50 Pages. $1. (Write Publications Office, Pan American Union, Washington 25, D. C. for Publication 016-E-6257 - Science Information in Latin America)

- ☐ COAL-MINE EXPLOSIVES, a statistical analysis of the principal official test used to determine the permissibility of coal-mine explosives. The official print of a 1959 paper, now available. 27 Pages. Single Copies Free. (Write U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa., ATTN: Publication-Distribution, regarding Report of Investigation No. 5760)

- ☐ LUNAR TRAJECTORIES, a "catalog" of coast paths between the Earth and the Moon. Covers flight times, velocity increments and launch azimuths for various positions of the Moon and various injection points in the northern hemisphere. 67 Pages. Single Copies Free. (Write National Aeronautics and Space Administration, ATTN: Code BID, Washington 25, D. C. regarding NASA Technical Note D-866)

- ☐ TUBULAR RIVETING IN SMALL PLANTS, a brief review published by the Small Business Administration on basic types of rivets, choice factors in fastening equipment, etc. Single Copies Free. (Write Service Department, Washington SCIENCE TRENDS, National Press Building, Washington 4, D. C. for Technical Aid No. 76)